REMARKS

Status of claims

Applicants thank the Examiner for the consideration given to the present application. Claims 1, 6, 9, and 10 have been amended. Support for the amendments and new claims is found in the specification and figures, and thus no new matter has been entered in the claims. Claims 1-6, 8-10, and 12-15 are pending in the present application.

Rejection of The Claims under 35 U.S.C. §102 and §103

Claims 1-4, 10, and 14-15 have been rejected under 35 U.S.C. 102(b) as being anticipated by Koslow (US 6,630,016). Claims 5-6, 8-9, and 12-13 have bee rejected under 35 U.S.C. 103(a) as being unpatentable over Koslow as applied to claim 1, and further in view of Rosenbaum (US 5,460,792). Claims 6 and 12-13 have been rejected under 35 U.S.C. 103(a) as being upatentable over Koslow as applied to claims 1 and 10, and further in view of Jagtoyen et al. (US 2004/0040906). Claim 8 has been rejected under 35 U.S.C. 103(a) as being upatentable over Koslow as applied to claim 1, and further in view of Judd et al. (US 5,376,279). Claim 9 has been rejected under 35 U.S.C. 103(a) as being upatentable over Koslow as applied to claim 1, and further in view of Denkewicz, Jr. et al. (US 5,772,896).

Applicants respectfully traverse the rejection of the claims and submit that none of the references, singularly or in combination, teach or suggest all the limitations of Applicants' claims, specifically, a filter formed from **mesoporous** activated carbon filter particles (defined as activated carbon particles with a sum of mesopore and macropore volumes of greater than 0.12 mL/g) **and mesoporous** activated carbon filter particles **coated with a cationic polymer**, wherein such a **filter has a Filter Bacteria Log Removal** of greater than about 2 logs and a **Filter Viruses Log Removal** of greater than about 1 log. Under 35 U.S.C. §102, a single prior art reference must, either expressly or inherently, teach each and every element of the claims. *MPEP 2131*. Moreover, in order to establish a prima facie case of obviousness under §103, the Examiner has the burden of showing, by reasoning or evidence, that: 1) there is some suggestion or motivation, either in the references themselves or in the knowledge available in the art, to modify that reference's teachings; 2) there is a reasonable expectation on the part of one of

ordinary skill in the art that the modification or combination has a reasonable expectation of success; and 3) the prior art references (or references when combined) teach or suggest all the claim limitations. *MPEP §2145.*

Applicants' independent claims 1, 10, and 15 recite a filter comprising, *inter alia*, a filter material formed in part from a plurality of **mesoporous** activated carbon filter particles and mesoporous activated carbon filter particles **coated with cationic polymer**, wherein the filter has a **Filter Bacteria Log Removal** (F-BLR) of greater than about **2 logs** and a **Filter Viruses Log Removal** (F-VLR) of greater than about **1 log**. Moreover, claim 10 further recites that the filter material is formed from other materials selected from the group consisting of activated carbon powders, activated carbon granules, activated carbon fibers, zeolites, activated alumina, activated magnesia, diatomaceous earth, activated silica, hydrotalcites, glass, polyethylene fibers, polypropylene fibers, ethylene maeleic anhydride copolymer fibers, sand, clay and mixtures thereof. Applicants' specification defines "mesoporous activated carbon filter particles" as activated carbon filter particles wherein the sum of the mesopore and macropore volumes may be greater than 0.12 mL/g, and "microporous activated carbon filter particles" as activated carbon filter particles wherein the sum of the mesopore and macropore volumes may be less than 0.12 mL/g. In addition, Applicants' specification further defines "mesopore" as an intra-particle pore having a width or diameter between 2 nm and 50 nm, and "macropore" as an intra-particle pore having a width or diameter greater than 50 nm.

A. Koslow Is Not A Proper Reference Under 35 U.S.C. §102(b)

Koslow is not a proper reference under 35 U.S.C. §102(b). Section 102(b) recites, in part, that a patent will not be allowed if the invention was patented or described in a printed publication in this country **more than one year prior to the date of the application** for patent in the United States. *35 U.S.C. §102(b).* Applicants respectfully submit that the present Application was filed November 11, 2003, which is a continuation-in-part of U.S. Application Serial Nos. 10/464,209 filed on June 18, 2003, and 10/464,210 filed on June 18, 2004. The present Application properly claims priority to the June 18, 2003, filing date of both of these applications. Applicants submit that these applications provide support for a filter formed, at least in part, from mesoporous activated carbon filter particles combined with a cationic

polymer. Koslow was published on July 31, 2003, and issued on October 7, 2003. As such, Koslow's publication date (July 31, 2003) and issue date (October 7, 2003) are both less than a year from the present Application's priority date of June 18, 2003, and filing date of November 11, 2003. Therefore, Applicants respectfully submit that Koslow is not a proper reference under 35 U.S.C. 102(b) and thus request the rejection of claims 1.4, 10, and 14-15 under 35 U.S.C. §102(b) be withdrawn.

B. The References Do Not Teach Or Make Obvious Applicants' Claims

Notwithstanding the argument set forth above, the Examiner asserts that Koslow teaches a filter material formed in at least in part from a plurality of mesoporous activated carbon filter particles (col. 2, lines 1-14), wherein the filter has a F-BLR of greater than about 2 logs and a F-VLR of greater than about 1 log. (Tables I and II). Moreover, the Examiner further asserts that Koslow teaches particles selected from the group consisting of mesoporous activated carbon filter particles coated entirely with a cationic polymer or mesoporous activated carbon filter particles partially coated with a cationic polymer. (Col. 6, lines 4-10). Applicants respectfully disagree with these assertions.

Contrary to the Examiner's assertion, there is no teaching or suggestion of mesoporous activated carbon in Koslow's column 2, lines 1-14, or for that matter, anywhere within Koslow. Instead, Koslow discloses the **average particle size of active particles** treated with a microbiological interception enhancing agent is between about 0.1 microns to about 5,000 microns. (Col. 2, lines 1-14). Applicants respectfully submit that the **average particle size taught by Koslow has nothing to do with the mesoporosity** of the activated carbon particles as recited in Applicants' claims, as the mesoporosity refers to the intra-particle pore volume, whereas the average particle size refers to the dimensions of the exterior of the particles themselves. As set forth above, the claim term "mesoporous activated carbon particles" has a as found in independent claims 1, 10, and 15 has a clearly defined meaning of activated carbon particles with a sum of **mesopore** (intra-particle pore volume) and **macropore** (intra-particle pore volume) **volumes of greater than 0.12 mL/g**. No such teaching or suggestion can be found in Koslow, particularly in column 2, lines 1-14. In fact, the Examiner acknowledged that Koslow does not disclose the mesoporous or macroporous pore volumes. (Office Action, par. 4).

Applicants further submit that Koslow's teaching of average **mean flow path** of less than about 2 microns is directed to the spacing between the active particles, and not the volume of the pores within a particle (intra-particle). (col. 2, lines 1-14). As such, Koslow cannot, and does not, teach or suggest, singularly or in combination with any other reference, Applicants' claimed mesoporous activated carbon filter particles, which are defined as having a sum of mesopore and macropore volume of greater than 0.12 mL/g.

Moreover, as also set forth above, Koslow teaches filter particles comprising a **microbiological interception enhancing agent**, including **both** a **cationic material**, being first coated onto the non-mesoporous activated carbon particles, **and then a biologically active metal** (e.g., silver) is precipitated onto the cationic material in order to achieve its efficacy as a filter (col. 1, lines 52-60). In sharp contrast, Applicants' invention **requires no biologically active metal** to achieve its F-BLR and F-VLR values. In other words, Applicants' claimed filter requires mesoporous activated carbons that are only coated with a cationic polymer without the additional aid of the biologically active metal as taught by Koslow to achieve its F-BLR and F-VLR values. In fact, Applicants submit that Koslow teaches away from Applicants' claimed invention because Koslow teaches that its active carbon requires the addition of this biologically active metal (e.g., silver) precipitated onto the cationic material, wherein Applicants' claimed invention does not require the biologically active metal to achieve its F-BLR and F-VLR values. Therefore, Applicants respectfully submit that Koslow does not teach or suggest, explicitly or inherently, singularly or in combination, a filter formed from **mesoporous** activated carbon filter particles as defined and claimed in Applicants' independent claims 1, 10, and 15, let alone a filter formed in part from **mesoporous** activated carbon filter particles **coated with a cationic** polymer, wherein the filter has a **F-BLR** of greater than about **2 logs** and a **F-VLR** of greater than about **1 log** as also recited by Applicants' claims.

In order to overcome the lack of teaching in Koslow regarding mesoporous and macroporous volumes, the Examiner alleges Rosenbaum teaches a filter with a sum of mesopore and macropore volumes between about 0.2 mL/g and 2 mL/g. (col. 12, lines 7-17) and rejects dependent claim 5, stating that it is not inventive to discover the optimum ranges. However, Applicants submit that Rosenbaum is **void of any teaching** or suggestion of its activated carbon filter being configured to remove, or being capable of removing, bacteria and/or viruses, let

alone a **filter having a F-BLR and a F-VLR** as recited in claims 1, 10, and 15. Moreover, Rosenbaum is void of any teaching or suggestion regarding cationic polymers, let alone mesoporous activated carbon filter particles coated with such a cationic polymer. (col. 13, line 59 - col. 14, line 30). Thus, considering this silence regarding the removal of bacteria and viruses and a cationic polymer, Applicants submit that one skilled in the art would not be motivated to combine Rosenbaum with Koslow.

In fact, Rosenbaum teaches **doping its activated carbon catalyst with a metal compound** and requires that its activated carbon catalyst possess "**acidity and pore volume sufficient to achieve complete oxidation** of the organic compounds at a temperature below about 400°C" to form his filter. (col. 1, lines 50-52). Applicants' invention requires no such metal compound or acidity to form its filter. Both, Koslow and Rosenbaum, disclose the necessity of a metal, either a biologically active metal or a metal compound, added to their activated carbon. Therefore, Applicants further submit that one skilled in the art would not be motivated to remove such metal against the teachings of the references. [add in obvious to try - hindsight law]. Moreover, neither reference, singularly or in combination, teaches or suggests that a mesoporous activated carbon filter particle may be successfully coated with a cationic polymer or that such a combination would form a filter having F-BLR and F-VLR. Thus, one of ordinary skill in the art would have no reasonable expectation of success in such a combination.

Assuming, *arguendo*, that one of ordinary skill in the art would be motivated to combine Rosenbaum with Koslow. The combination still does not suggest or disclose a mesoporous activated carbon filter particle coated with a cationic polymer forming a filter that has F-BLR and F-VLR values, because neither reference teaches or suggests, singularly or in combination, a mesoporous activated carbon forming a filter capable of removing bacteria or viruses, let alone at the F-BLR or F-VLR as recited in Applicants' claims 1, 10, and 15. As set forth above, Koslow teaches a non-mesoporous activated carbon filter capable of removing bacteria and viruses and Rosenbaum is completely void of any teaching or suggestion regarding its activated carbon catalyst being capable of removing bacteria or viruses. Thus, Applicants respectfully submit that Koslow and Rosenbaum, singularly or in combination, do not teach or suggest a mesoporous activated carbon filter particle coated with a cationic polymer forming a filter that has F-BLR and F-VLR values as recited by Applicants' claims 1, 10, and 15.

In rejecting dependent claims 6 and 12-13, the Examiner alleges that Jagtoyen et al. teach a filter material formed in at least in part from a plurality of mesoporous activated carbon filter particles having a BRI of greater than about 99% (Par. 44) and a VRI of greater than about 90% (Par. 21). However, Applicants respectfully submit that the teachings of Jagtoyen et al. have been misunderstood. Although Jagtoyen et al. teach a BRI of greater than 99% (Par. 44) and a VRI of greater than 90% (Par. 21), Applicants submit that these bacteria and viruses removal indices are **not** for **mesoporous** activated carbon filter particles, **but** for **microporous** activated carbon filter particles.

For example, in paragraph 96 of Jagtoyen et al., Jagtoyen et al. teach a composite fiber having a micropore volume of 0.37 - 0.51 cc/g, no macropores, and low mesopore volume. (para. 96, Jagtoyen et al.). Applicants submit that the activated carbon particles having the low mesopore volume and zero macropore volume taught by Jagtoyen et al. are considered **microporous** activated carbon particles, **not mesoporous** activated carbon particles as defined within the specification and claimed by the Applicants. In support, Applicants point to their specification that defines "microporous activated carbon filter particles" as activated carbon filter particles having a sum of mesopore and macropore volumes of **less than 0.12 mL/g**, and "mesoporous activated carbon filter particles" as activated carbon filter particles having a sum of mesopore and macropore volumes of **greater than 0.12 mL/g**. (p. 9, lines 20-23 and lines 17-19, respectively).

Applicants further submit that it is generally accepted by those of ordinary skill in the art that **microporous** activated carbon filter particles include **low mesopore volumes, generally less than 0.1 mL/g** such as the coconut carbon shown in Applicants' Figures 7a and 7b. This coconut carbon filter material comprises microporous activated carbon filter particles having, for example, mesopore volumes of less than 0.09 mL/g. Thus, Jagtoyen et al's low mesopore (i.e., less than 0.1 mL/g) and zero macropore (i.e. 0 mL/g) activated carbon particles would teach a sum of mesopore and macropore volumes of less than 0.1 mL/g (0.1 mL/g + 0 mL/g), which **definitely does not teach or suggest** Applicants' **mesoporous activated carbon particles** as defined and recited in claims 1, 10, and 15.

Moreover, Jagtoyen et al. does not include any teaching or suggestion regarding cationic polymers or cationic polymers coating its microporous (non-mesoporous) activated carbon filter

particles. Therefore, in light of Jagtoyen et al.'s lack of teaching or suggestion regarding both, mesoporous activated carbon filter particles and coating cationic polymers thereon, Applicants submit that one of ordinary skill in the art would not be motivated to combine Jagtoyen et al. with Koslow and/or Rosenbaum. In fact, Applicants submit that in teaching the use of a low mesopore and no macropore activated carbon particles (i.e., microporous activated carbon particles) to form a filter material to remove microorganisms from water, Jagtoyen et al. actually teach away from Applicants' claimed filter formed from mesoporous activated carbon particles (sum of mesopores and macropores volumes > 0.12 mL/g) to remove bacteria and viruses.

Assuming, *arguendo*, that one of ordinary skill in the art would be motivated to combine Jagtoyen et al. with Koslow and/or Rosenbaum, the combination still do not teach or suggest all of Applicants' claim limitations. As set forth above, Jagtoyen et al. does not teach mesoporous activated carbon filter particles forming a filter capable of removing bacteria or viruses, let alone at the claimed F-BLR and F-VLR. Moreover, Jagtoyen et al. do not even teach or suggest the F-BLR or F-VLR as defined and claimed by the Applicants. Applicants' claimed F-BLR of greater than 2 logs and F-VLR of greater than 1 log refer to the filter's bacteria and viruses removal capability after the passing of the first 2,000 filter material pore volumes. In sharp contrast, Jagtoyen et al.'s Tables 1-3 and 6-7 do not teach or suggest such F-BLR and F-VLR values after the first 2,000 filter material pore volumes.

For example, Jagtoyen et al.'s Table 2 teaches its bacteria log removal values at a maximum flow rate of 10 columns/hour, which equates to approximately 4.3 filter material pore volumes per hour (using a typical filter bed porosity of 0.43), and for a maximum time period of 28.9 hours. To properly compare Jagtoyen et al.'s Table 2 bacteria log removal values to Applicants' claimed bacteria log removal values at 2,000 filter material pore volumes, the 4.3 filter material pores volumes per hour must be multiplied by the 28.9 hours to arrive at the value of 124 filter material pore volumes. Thus, Jagtoyen et al.'s Table 2 bacteria log removal values are only after the passing of 124 filter material pore volumes as compared to Applicants' claimed bacteria log removal values after the passing of the significantly higher 2,000 filter material pore volumes. Jagtoyen et al.'s Table 3 teaches bacteria log removal values at a maximum flow rate of 10 columns/hour, which equates to approximately 4.3 filter material pore volumes per hour, and for a maximum time period of 20 minutes. To properly compare Jagtoyen et al.'s Table 3

bacteria log removal values to Applicants' claimed bacterial log removal values at 2,000 filter material pore volumes, the 4.3 filter material pores volumes per hour must be multiplied by the .333 hours (20 minutes converted to hours) to arrive at the value of 1.4 filter material pore volumes. Thus, Jagtoyen et al.'s Table 3 bacteria log removal values are only after the passing of 1.4 filter material pore volumes as compared to Applicants' claimed bacteria log removal values after the passing of the significantly higher 2,000 filter material pore volumes.

Jagtoyen et al.'s Table 6 teaches bacteria log removal values at a maximum flow rate of 8.8 columns/hour, which equates to approximately 3.78 filter material pore volumes per hour, and for a maximum time period of 6 hours. To properly compare Jagtoyen et al.'s Table 6 bacteria log removal values to Applicants' claimed bacteria log removal values at 2,000 filter material pore volumes, the 3.78 filter material pores volumes per hour must be multiplied by the 6 hours to arrive at the value of 22.7 filter material pore volumes. Thus, Jagtoyen et al.'s Table 6 bacteria log removal values are only after the passing of 22.7 filter material pore volumes as compared to Applicants' claimed bacteria log removal values after the passing of the significantly higher 2,000 filter material pore volumes. Finally, Jagtoyen et al.'s Table 7 teaches bacteria log removal values at a maximum flow rate of 67 columns/hour, which equates to approximately 28.8 filter material pore volumes per hour, and for a maximum time period of 9.5 minutes. To properly compare Jagtoyen et al.'s Table 7 bacteria log removal values to Applicants' claimed bacteria log removal values at 2,000 filter material pore volumes, the 28.8 filter material pores volumes per hour must be multiplied by the 0.16 hours (9.5 minutes converted to hours) to arrive at the value of 4.56 filter material pore volumes. Thus, Jagtoyen et al.'s Table 7 bacteria log removal values are only after the passing of 4.56 filter material pore volumes as compared to Applicants' claimed bacteria log removal values after the passing of the significantly higher 2,000 filter material pore volumes.

In summary, Jagtoyen et al.'s Tables 2, 3, 6, and 7 only teach a filter that has a bacteria log removal for only a maximum of 124, 1.4, 22.7, and 4.56 filter material pore volumes, respectively, which are significantly lower than and do not even come close to Applicants' claimed F-BLR and F-VLR values after the passing of the first 2,000 material pore volumes as recited in Applicants' claims 1, 10, and 15. Therefore, Applicants submit that Jagtoyen et al. also

does not teach or suggest Applicants' claimed F-BLR and F-VLR values as incorrectly asserted by the Examiner.

Accordingly, Applicants submit that since Koslow, Rosenbaum, or Jagtoyen et al., singularly or in combination do not teach or suggest a filter formed, at least in part, from mesoporous activated carbon filter particles capable of removing bacteria and viruses, then such combination of references **do not teach or suggest a filter** formed, in part, from **mesoporous** activated carbon filter particles, wherein the filter has a **F-BLR** of greater than about **2 logs** and a **F-VLR** of greater than about **1 log** as recited in Applicants' claims 1, 10, and 15. Therefore, Applicants respectfully request that the rejection of claims 1, 10, and 15 under 35 U.S.C. 102 and 35 U.S.C. 103 be withdrawn. As claims 2-6, 8, 9, and 12-14 depend from independent claims 1 or 10, Applicants request the rejection of these claims be withdrawn as well.

CONCLUSION

Applicants respectfully submit that the present application is in condition for allowance. The Examiner is encouraged to contact the undersigned to resolve efficiently any formal matters or to discuss any aspects of the application or of this response. Otherwise, early notification of allowable subject matter is respectfully solicited.

Respectfully submitted,
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